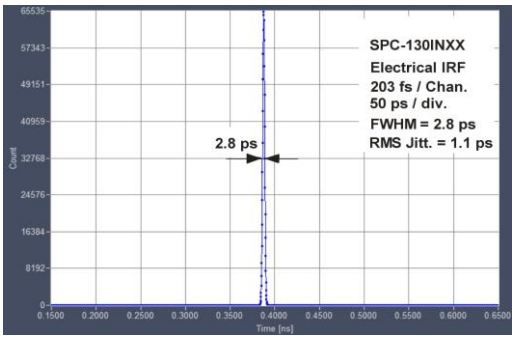
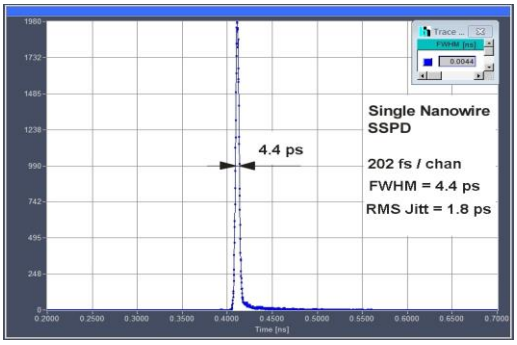
SPC-130INXX TCSPC Module

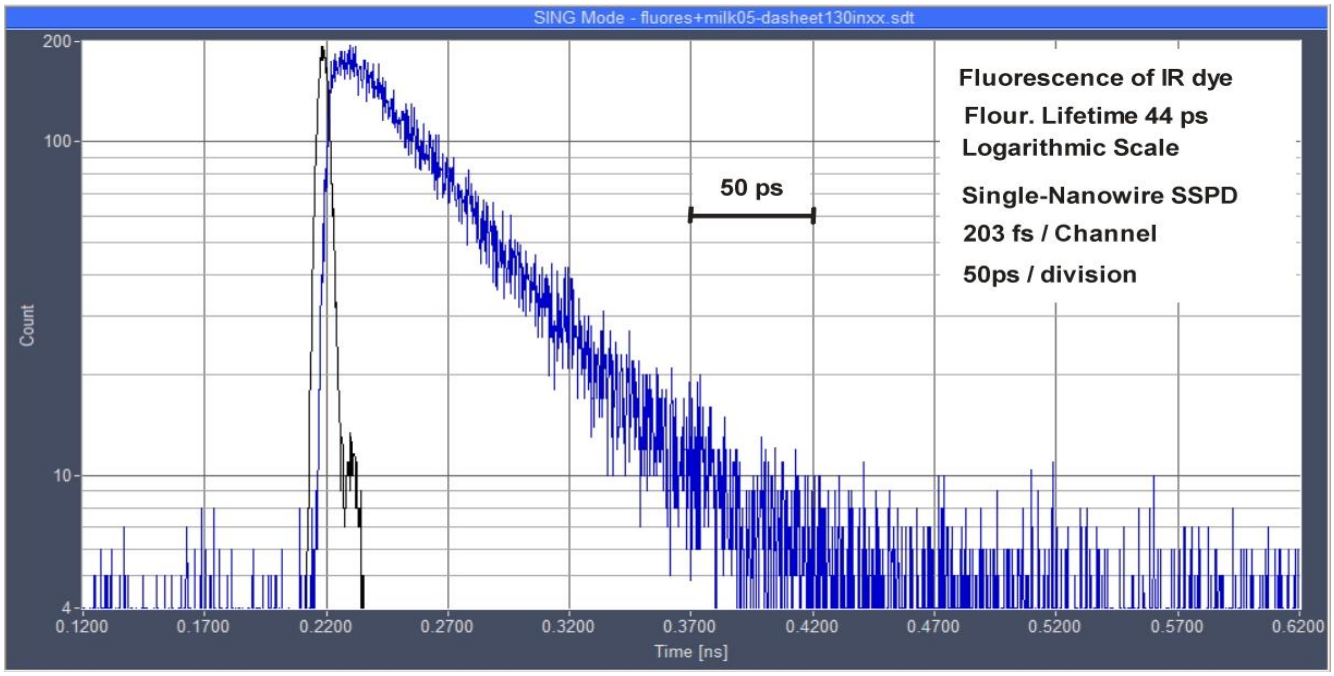
Ultra-High Resolution Time-Correlated Single Photon Counting Module

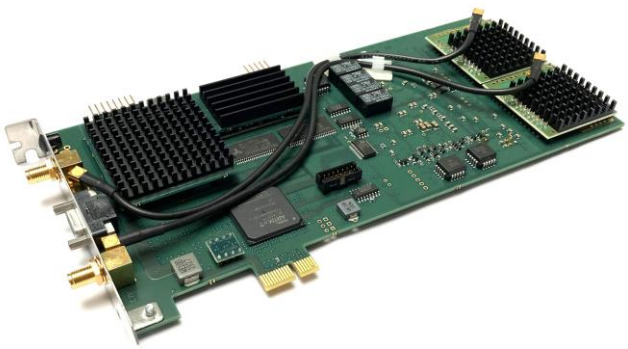
SPC-180NXX technology
High-throughput PCI-Express interface
Ultra-fast, ultra-stable timing electronics
Electrical IRF width typ. 2.8 ps, FWHM
Internal timing jitter 1.1 ps, RMS
Time-channel width down to 203 fs
Discriminator input bandwidth 4 GHz
Recording-time interval 0.83 ns to 50 ns
Photon distribution and parameter-tag modes
Multi-detector / multi-wavelength capability
Excitation-wavelength multiplexing
Parallel operation of 2, 3 or 4 modules
Laser repetition rates up to 150 MHz
Dead time 80 ns
Saturated count rate 12.5 MHz

Ideal for superconducting NbN detectors (SSPDs)
Ideal for ultra-fast hybrid detectors
Ultra-high resolution fluorescence-lifetime experiments
Photon correlation
Anti-bunching experiments
NIRS and fNIRS experiments at short distance
Simultaneous multi-wavelength detection
Simultaneous fluorescence / phosphorescence









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Photon Channel

Principle	Constant Fraction Discriminator (CFD)
Discriminator Input Bandwidth	4 GHz
IRF Width, FWHM	< 3 ps, FWHM
RMS Timing Jitter	< 1.1 ps, RMS
Variance in Time of IRF Centroid	<0.4 ps RMS over 100 seconds
Optimum Input Voltage Range	-30 mV to -500 mV
Min. Input Pulse Width	200 ps
Threshold	0 to -500 mV
Zero Cross Adjust	- 100 mV to + 100 mV

Synchronisation Channel

Principle	Constant Fraction Discriminator (CFD)
Discriminator Input Bandwidth	4 GHz
Optimal Input Voltage Range	-30 mV to -500 mV
Min. Input Pulse Width	200 ps
Threshold	0 to -500 mV
Frequency Range	0 to 150 MHz
SYNC Frequency Divider	1 - 2 - 4
Zero Cross Adjust	-100 mV to +100 mV

Time-to-Amplitude Converters / ADCs

Principle	Ramp Generator / Biased Amplifier
TAC Range	12.5 ns to 125 ns
Biased Amplifier Gain	1 to 15
Biased Amplifier Offset	0 to 50 % of TAC Range
Time Range incl. Biased Amplifier	0.83 ns to 125 ns
Min. Time / Channel	203 fs
ADC Principle	50 ns Flash ADC with Error Correction
Diff. Nonlinearity, Electrical	< 0.5 % RMS, typ. <1 % peak-peak

Data Acquisition (Histogram Modes)

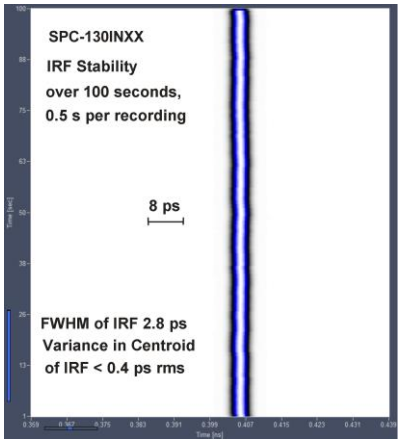
Method	on-board multi-dimensional hardware histogramming process
Dead Time	80 ns, independent of computer speed
Saturated Count Rate	12 MHz
Useful Count Rate	6 MHz
Max. Counts / Time Channel (Counting Depth)	2^{16}-1
Overflow Control	none / stop / repeat and correct
Collection Time	0.1 us to 100,000 s
Display Interval Time	10 ms to 100,000 s
Repeat Time	0.1 us to 100,000 s
Sequential Recording	Unlimited recording by memory swapping
Routing	7 bit TTL / CMOS
Count Enable	1 bit TTL / CMOS
Experiment Trigger	TTL / CMOS

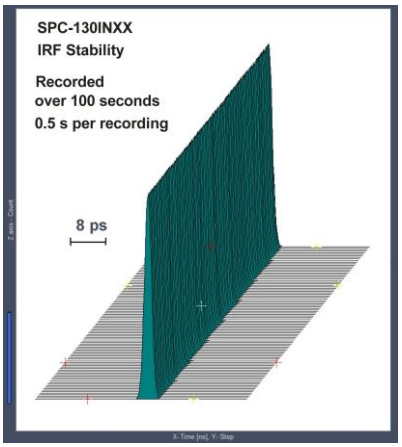
Data Acquisition (FIFO / Parameter-Tag Mode)

Method	Parameter-tagging of individual photons, continuous writing to disk
Online Display	Decay function, FCS, Cross-FCS, PCH, MCS traces
FCS Calculation	Multi-tau algorithm, online calculation and online fit
Number of Counts of Decay / Waveform Recording	unlimited
Dead Time	80 ns
Saturated Count Rate, Peak	12 MHz
Sustained Count Rate (Bus-transfer Limited)	5 MHz
Max. Counts / Time Channel (Counting Depth)	unlimited
Output Data Format (ADC / Macrotime / Routing)	12 / 12 / 4 bit
On-board FIFO Buffer Capacity (Photons)	$2 \cdot 10^6$
Macro Timer Resolution, Internal Clock	25 ns, 12 bit, overflows marked by MTOF entry in data stream
Macro Timer Resolution, Clock from SYNC Input	10 ns to 100 ns, 12 bit, overflows marked by MTOF entry in data stream
Routing	4 bit TTL / CMOS
External Event Markers	4 bit, TTL / CMOS
Experiment Trigger	TTL / CMOS

Operation Environment

Computer / Operating System	PC Pentium, multi-core, >8GB RAM, Windows 10, Windows 11
Bus Connector	PCI-ex
Used PCI-ex Slots	1
Total Power Consumption	approx. 12 W from +12V
Dimensions	230 mm x 130 mm x 18 mm





Related Products

SPC-130IN, SPC-130INX, SPC-180N, SPC-180NX, SPC-180INXX, SPC-150N, SPC-150NX, SPC-150NXX TCSPC modules, HPM-100-06 and -07 hybrid detectors
BDL-SMN ps diode lasers, BDS-SM, picosecond diode laser, DCS-120 multiphoton FLIM systems

Related Literature

W. Becker, The bh TCSPC Handbook, 9th edition (2021). 950 pages, available on https://www.becker-hickl.com. Please contact bh for printed copies.
The bh TCSPC Technique, Principles and Applications. Overview brochure, 27 pages. Available on https://www.becker-hickl.com

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